# "Fairy rings" of participation: the invisible network influencing participation in online communities

Book Section

# *"Fairy Rings" of Participation: The invisible network influencing participation in online communities*

*Elpida Makriyannis*

*Institute of Educational Technology, Open University, e.makriyannis@open.ac.uk*

*Anna DeLiddo*

*Institute of Educational Technology, Open University, a.deliddo@open.ac.uk*

## Abstract

Individuals participate in many different ways in online communities. There is an extensive body of research describing participation as a key metaphor in communities of practice and stressing that participatory mobility is influenced by underground multidirectional activities, directed away from the notion of periphery to the centre practices and taking the shape of expansive swarming and multidirectional pulsations. This article describes an ongoing observational study proposing a model that attempts to determine how users participate in online communities and what influences them to alter the way in which they participate. We performed daily observations on user participatory behaviour in 50 online communities using public domain – anonymous data available in the communities. The specific communities were selected because they are related to learning and support learning activities within their networks. The data observations collected were analysed using Compendium, a hypermedia knowledge mapping and sense-making tool, to represent and structure the data, make complex cross data queries, test hypotheses and build representation of real examples to support our claims. Initial findings indicate that users connect, participate, contribute and collaborate on a shared objective, transferring information and pooling knowledge within and between communities in four different modes. During their online journey, users switched between modes of participation or even remained in one specific mode, implying that the way in which users participate in an online community is not just related to the mode of participation and the level of engagement with the community but it is also due to hidden reasons or motivations, an invisible network of interactions of elements that affect the willingness of the user to participate. This layer is not immediately evident in the user actions but can be inferred by analysing user reactions. It is argued that user participation in online communities occurs in two layers; the "visible" layer of participation with the different modes; and the "invisible" layer of element interactions, similar to formations observed in nature when a radically spreading underground network of fungi activity results in a ring or arc formation of mushrooms, also known as a "fairy ring". These underground multidirectional activities influence participation and participatory mobility. Following an open scientific inquiry approach and an open research paradigm we plan to share these observations with a wider audience of practitioners, researchers and theorists for all to test or contest our arguments, and to enrich, question, or support our model.

## Keywords

Online communities, activity theory, Compendium, open research paradigm

## Introduction

The emergence of the internet has enabled individuals to connect and participate in online activities in ways never before imaginable. Individuals are producing knowledge together through contributions in a collaborative environment that also allows individual voices to be heard more than ever before. Users are downloading, uploading, commenting, creating, co-creating and sharing content that is generated by themselves, their friends and peers or even by total strangers. These activities take place within communities, where individuals connect to each other through a shared object, a common purpose or interest that is important to them. This shared object of social activity is a powerful generator of change, unlocking a range of possibilities, actions and reactions.

Activities performed in a shared environment, both trigger change in user behaviour and can help explain the reasons influencing that change (Engeström 2009, Nardi 2006).

In this paper we focus on user activities in online communities that support learning activities in social networks. The study was carried out, by performing daily observations on users and their participatory journey in digital spaces. The data we gathered from these observations is publicly available and the identities of the users remain anonymous. We analysed this data using a hypermedia knowledge mapping and sense-making tool, to structure and represent the data, make cross data queries, test hypotheses and build representation of real examples to support our claims. Initial findings indicate that users connect, participate, contribute and collaborate on a shared objective, transferring information and pooling knowledge within and between communities in four different modes. The next section describes the theoretical background that informed our approach. In the third section, we describe the case study, the data collection process, and the tool that has been used to perform the data analysis. In the fourth section, we discuss the results giving some summary examples of observed user activities. Based on this analysis in the fifth section we propose a model to classify and describe modes of online participation. Finally, we discuss our hypothesis that an "invisible" network of interactions exists underneath apparent user actions which deeply affects user behaviour in online participation. This process is similar to a biological process evident in nature when radically spreading underground network of fungi activity results in a ring or arc formation of mushrooms also known as a "fairy ring".

## How Does Participation Emerge in Communities?

In The Reader-to-Leader Framework, (Preece & Shneiderman, 2009) a framework is presented which is supported by extensive references to the research literature describing what motivates technology-mediated social participation in online communities. According to the authors, newcomers start by initially reading content on the site and gradual legitimate peripheral participation. Enticing content that is regularly updated encourages the user to return and become a contributor, by uploading information, commenting, enquiring or rating content. The next stage is for fewer users to become regular contributors and start collaborating with others, gaining a sense of community, supporting the group, seeing their actions being reciprocated and also being rewarded and gaining status and reputation. In the final stage, a small fraction of users become leaders, who participate in governance and take on a leadership role. The authors categorise the successive levels of participation as *reading, contributing, collaborating* and *leading*.

Through the notion of communities of practice (CoP), the importance of participation as a key metaphor involving individuals in a community of a specific practice is highlighted. Participation refers to when these individuals are active participants involved in the community (Wenger, 1998). (CoP) form around a domain of interest, members engage in community activities assisting and sharing practices, resources, approaches and experiences with other community members. Communities are created, developed and managed by the members themselves rather than pre-determined and constructed by some external actors. Initially joining and learning at the periphery, members become more involved as they become more competent. A community of practice is characterised by movement from the periphery towards the centre of the community (Lave & Wenger, 1991).

However, this mobility directed from the novice to the master, from the periphery to the centre, has changed. The emphasis of a relatively uniform notion of "central" practice is breaking down and multiple models of practice are forming in its place (Squire & Durga, in press). Engeström (Engeström, 2009) suggests that this mobility takes the shape of expansive swarming and multidirectional pulsations. This mobility is presented as the underpinning of wildfire activities. Wildfire activities are powerful underground activities occurring through "horizontal and multidimensional connections". These underground activities are compared to mycorrhizae, symbiotic associations between the fungus and roots of a plant, consisting of heterogeneous participants working together with plants and organisms on mutually beneficial or exploitative partnerships. In a mycorrhizae-like formation, members are identified by their activism.

## An Observational Study to Understand User Participation in Online Communities



ISBN 978-1-86220-225-2

An observational analysis methodology was used in order to understand user activities in online communities and to investigate and better understand systematic patterns of behaviour that users follow. The resulting observations immersed after spending a period of time studying the specific sites, not only recording user actions but also seeking to understand the community environment and user activities as they naturally occurred. As a technique of observation we recorded and coded computer logs of the user activities on publicly available information within the communities. We carried out an observational study, because we actually didn't have any direct involvement with the end users and we didn't record their activities in a richer format such as video or audio records. This choice has been driven by the fact that; 1. We wanted to reach a bigger number of users, active in different user communities and 2. We wanted to prevent any actions that would influence user behaviour. We argue that such a technique of user observations minimises technological and human intrusion in user activities, thus making the observational analysis sounder and allowing us to focus our analysis on activity types and patterns of behaviours. For the next phase of this research work, however, we plan to organise deeper behavioural experimentations to have a better understanding of the rationale behind user actions. The information we collected while performing these daily observations included; profile information (what users publicly said about themselves); downloading and uploading content; joining groups; commenting and rating; "following" and "friending" others; creation and co-creation of content; membership in other online communities and if there is any information transfer between communities and the type of activities they perform in each online community.

### A Knowledge Management Tool to Support Data Analysis and Representation

The database of user activity observations grew quickly- since we were observing a wide range of activities in online communities over a 30 day period, until it became too large to manage and analyse. To support our data analysis and representation we used Compendium, a hypermedia and knowledge management tool for individual and collective sense-making. In the literature it is referred to as an approach to gather, structure, represent, and manage knowledge for individual or collaborative knowledge intensive works (Selvin & et al, 2001).

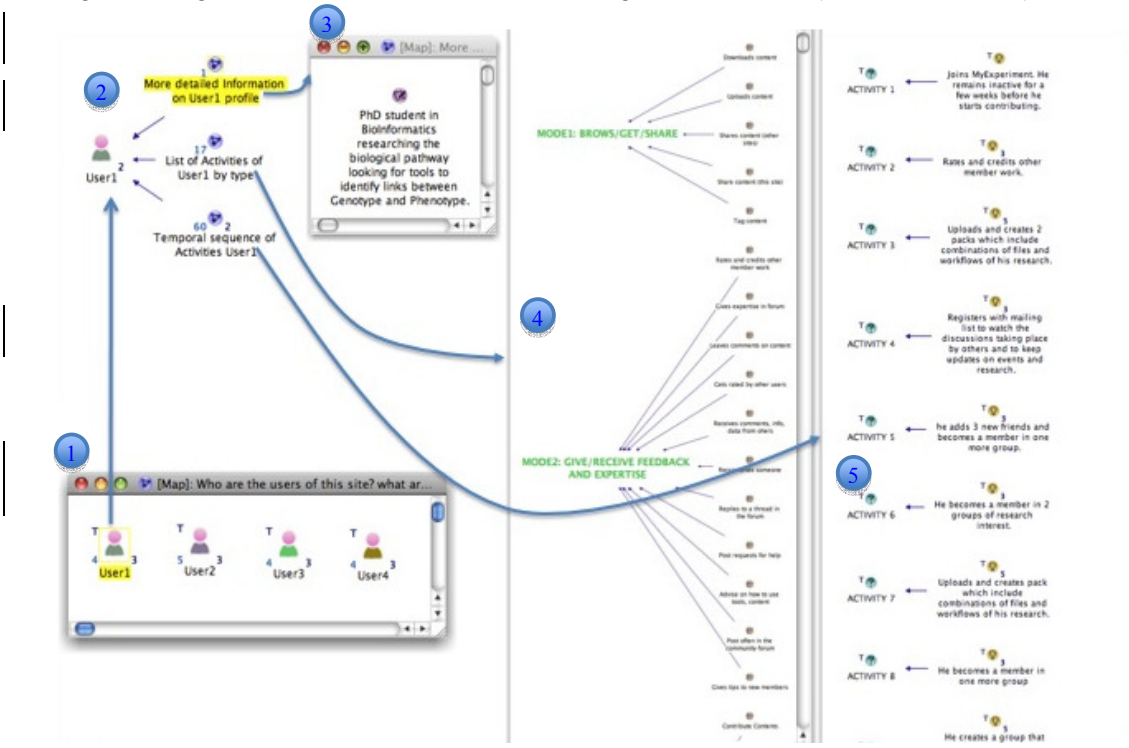



**Figure 1: Representation and structuring of the data with Compendium**

In Compendium, knowledge objects (ideas, multimedia documents, artefacts, etc) are represented as nodes of a graph-like structure; nodes are linked to each other in order to make sense of individual and/or collective



ISBN 978-1-86220-225-2

concepts and interpretation. When employed for knowledge management applications, Compendium provides diverse features for managing knowledge, making sense of knowledge content and using and reusing information in disparate knowledge works. Ideas, notes, hypermedia files and multimedia documents can be tagged, linked and enriched with comments, customized icons, backgrounds, and link types. Knowledge management applications range from managing a PhD research (Selvin & Buckingham Shum, 2005) to political debate representation (Renton & Macintosh, 2007). In all these applications, sense-making and information structuring is committed to a knowledge manager who has to organise the content according to specific objectives related to the issue at hand.

Compendium has been used to structure and represent our data observations in a form of hyper-textual network of annotations. Each annotation consists of a description of the observed user action plus a note from the analyst with the interpretation of that action. Summaries of daily activities, in general, included more than one user action plus researcher's interpretation and notes on user behaviour. All observations have been recorded daily first in an Excel sheet reporting user behaviour per summary of daily activities. Compendium supports automatic file import from Excel so the cells in the Excel sheet have been converted in Compendium nodes. Every observation (summary of daily activities included in each cell) has been tagged with the following information: author, website, activity type, and activity stage (ordered by day of observation, from 1 to 30). Compendium enables the organisation and exploration of data by following a customisable information structure. Figure 1 shows the basic exploration pathways: Starting from the group of observed users (1 in Fig1), and selecting a user (2 in Fig1), it is possible to access information on user profile (3 in Fig1), actions by type (4 in Fig1) and by activity sequence, and follow the evolution of user activities by time (5 in Fig1).

Every node can have more than one tag; therefore daily activities that include more than one activity are tagged with multiple activity types. This flexibility of the tool assists in making more detailed and complex queries to the database such as: What other activities users perform while remixing? Is there any user that remixes but doesn't co-create? What users are remixing and what are the remixing activities? What activities usually follow activity of grouping (create a group or join a group)? Is there any relationship between rating activities, user accreditation and uploading and sharing activities? A powerful feature of Compendium is that it represents data observations as hyperlinked nodes, allowing for multidirectional exploration of the database, helping the observer to infer hidden connections and meanings between data.

## Modes of Participation: Observing User Activities in Digital Spaces

From the exploration and analysis of the data observations with the use of Compendium, four modes of user participation emerged, these are:

- MODE 1: To browse, gather and share content (Figure 2)
- MODE 2: To give / receive feedback and expertise (Figure 3)
- MODE 3: To collaborate and jointly decide about actions (Figure 4)
- MODE 4: To share control over the content and the community (Figure 5)

Figures 2,3,4, and 5 show the different activities taking place in each of the four modes of participation. In this section we provide evidence in the form of narratives from user activity observations focusing on 3 very interesting findings: 1. Users go through "modes" and not through "stages"; Users staying in one "mode" through the entire journey; and 3. Users switching between selected "modes".

1. Users go through "modes" and not through "stages". The following user journey is an example:

> Artist looking for collaborations, starts contributing content immediately. Then stops for a long period. The user writes about this explaining that they didn't have a motive to continue. Downloads a lot of content before starting to contribute original material to the project. Posts many comments and rates content. Starts contributing original work again. Signs up for collaborative projects. Asks guidance on using the technology on the site. Receives feedback and help from other members. Contributes original content, which is jointly revised and used by other members of the community. Initiates and organises events and competitions for the



ISBN 978-1-86220-225-2

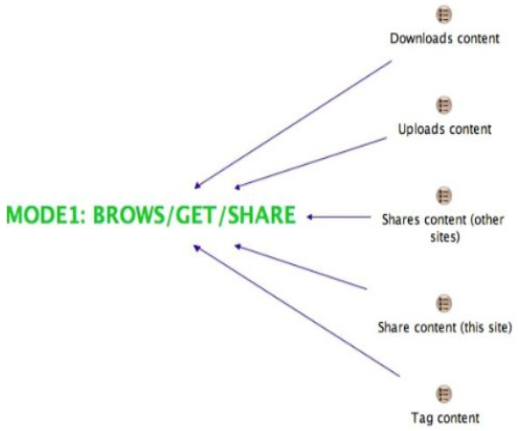
> whole community. Becomes more involved in the community, sharing control and decisions about the content and the community with other members. (User code: CMSU13)

In this example the user is initially active in Mode 3 (contributing content), then remains inactive for a while (no participation), and then starts participating again but in a different mode, Mode 1 (downloading content), switches between Mode 2 (asking for guidance) and Mode 3 (contributing content, jointly revised) for a while and then switching to Mode 4 (shared control over the content and community). In most user cases in the database there seems to be a pattern of participation whereby if the community reciprocates positively to his activities, the user will become more involved whereas if the community doesn't reciprocate he becomes less active and even stop participating.

2. Users staying in one "mode" through the entire period. The following user journey provides such an example:

> Academic interested in creating new research methods. He contributes in a very specific manner, by uploading research papers and presentations. He creates an online group that has the same name and members as his research group at the University. He only collaborates and jointly decides about the research content with his real-world research peers. He creates new workflows with the people that he has co-written the publications. The co-authors of his papers are also members in his online community research group. (User code: MEPU2)

The user is active in Mode 3 (contributing content and jointly deciding with other groups) through the entire observation period. Many observations in our database show users with influence and status in the equivalent real-world (physical) communities (i.e. professors, artists, prolific scientists etc) displaying a very confident and specific participatory behaviour. However, further investigation and evidence is required to support this claim.




**Figures 2: Participation in Mode 1**

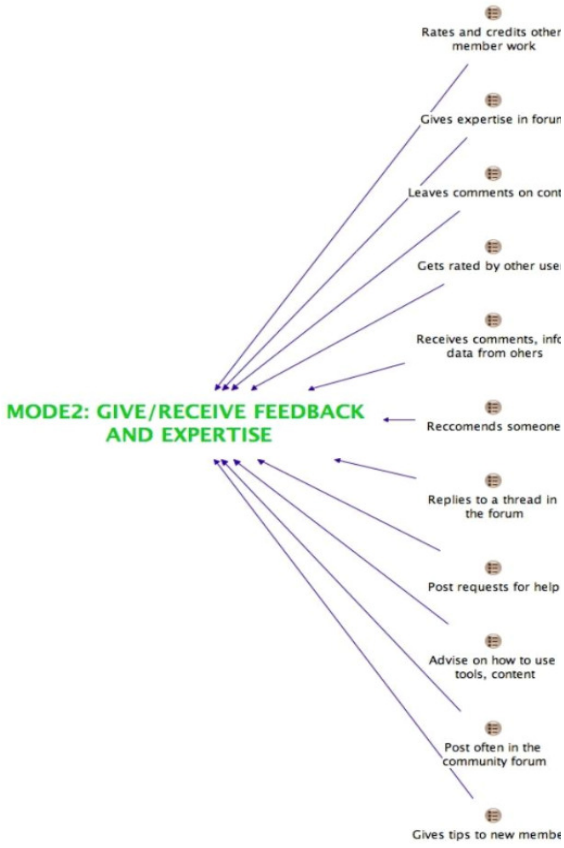
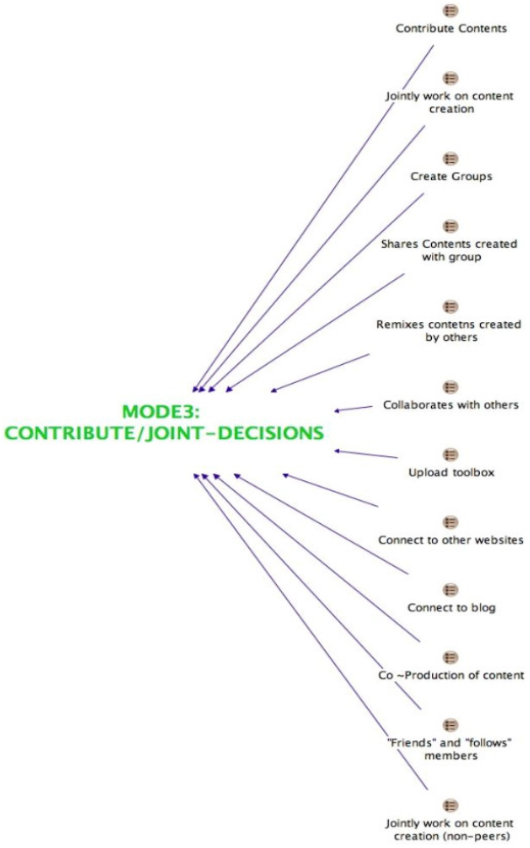



**Figure 3: Participation in Mode 2**



ISBN 978-1-86220-225-2




**Figures 4: Participation in Mode 3**

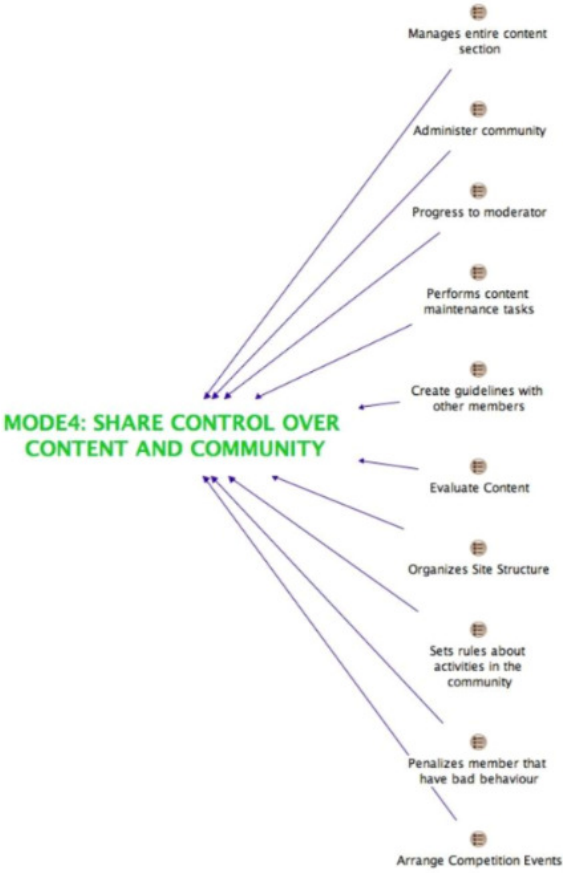



**Figure 5: Participation in Mode 4**

3. Users switching between selected "modes". The following user journey is such an example:

> Developer involved in the open source movement. Gives feedback and advice on forums. Many members respond to his feedback. Often posts in community forum. Becomes community manger for entire community, editing, reviewing and managing the content and entries. Gets very high ranking from the other members. Receives highest level of permission from the other administrators in the community. Communicates with all other moderators and administrators to set general guidelines. Adds guidelines for specific issues. Performs most maintenance tasks. Explains guidelines to newer members of the community. (User code: ODPU34)

This user is active in Mode 2 initially and then goes straight to Mode 4. There are two important observations in this example; a. If the community reciprocates positively to a user and his / her activities they move to more intense and involved modes of participation. This was also evident in example journey 1; and b. In Mode 4, the most intense and involved mode of participation, the users are "sharing control with others" rather than "leading" (which was the case in the "Reader to Leader" framework) over the content and the community and acquiring different roles (administrator, moderator, manager etc) to further involve other members and ensure that the community is protected against violations and vandalism.



ISBN 978-1-86220-225-2

The above examples seem to imply that the way in which a user contributes to an online community is not just related to the mode of participation and the level of engagement with the community but it is due to hidden reasons or motivations that affect the user's willingness to participate.

## The Invisible Network of Interactions

During our observational analysis we discovered that the way in which a user participates in an online community is not just related to the level of engagement and the mode in which he / she decides to participate, but is also influenced by several hidden elements that affect the user's willingness to participate. When we initially observed this process, through the daily observations of the user activities, we started investigating what was affecting participation and why users changed between modes. Several elements i.e. reciprocity, identity, real-world probes, were detected that deeply influenced and affected how users behaved online. These elements are not immediately evident in the user actions that we observe in the "visible" layer, but can be inferred by analysing user reactions. These elements seem to form an underground "hidden" network, an "invisible" layer that affects how users participate in the community. When the dynamics of these element formations change there is a shift in position or switching between modes for the user.

Referring to the theoretical basis of our approach, Yrjö Engeström (Engeström, 2009) talks about mycorrhizae-like formations, an "invisible organic texture underneath visible fungi" to explain powerful underground activities - wildfire activities - that occur through "horizontal and multidimensional connections". Such formations are also observed when a radically spreading underground network of fungi activity results in a ring or arc formation of mushrooms. This biological process is also known as a "fairy ring" of mushrooms dependable on a network of fibres underground that is not visible.

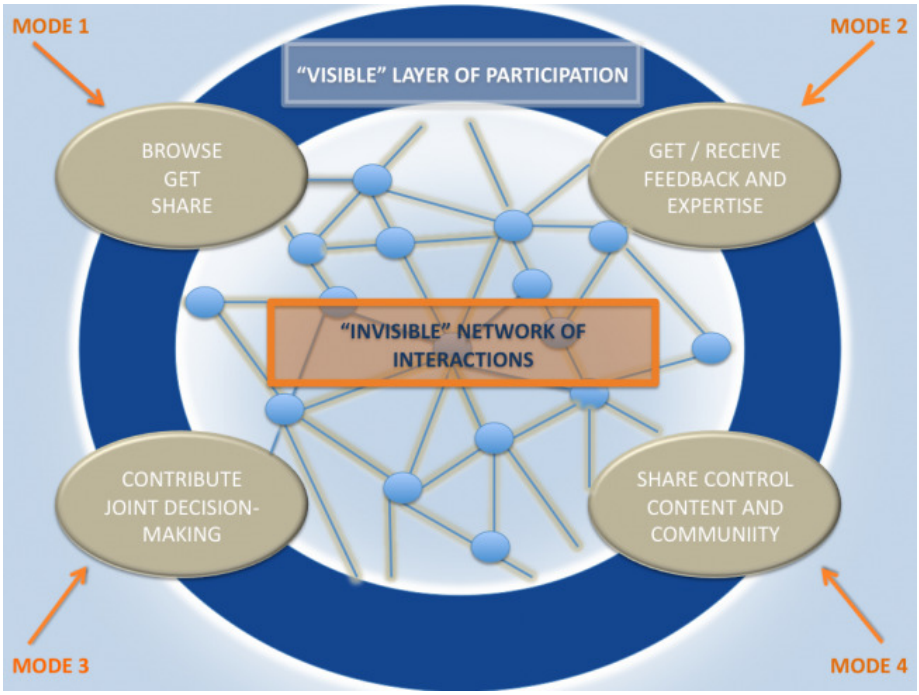



**Figure 6: The "visible" and "invisible" layers of participation**

Figure 6 depicts the two layers of our model, the "visible" layer of participation with the different modes and the "invisible" layer of element interactions that is not immediately evident but can be inferred by analysing user reactions and understanding the reasons behind switching between modes of participation. In our model, the process of elements interacting and forming an underground "hidden" network, an "invisible" layer, which



ISBN 978-1-86220-225-2

affects user participation in the community, seems to mimic the "fairy ring" phenomenon occurring in nature. We call this process a "fairy ring" of participation, participation that emerges like "fairy rings" in online communities, because although the "visible" layer shows the user activities in different modes, it is the "invisible" network of element interactions that controls and influences these activities. Planned future work will be important to support our claims and identify the specific role of each of these elements.

## Conclusions and Future Work

In this study we performed daily observations on users and their participatory journey in 50 online communities. The data observations collected were analysed using Compendium, a hypermedia knowledge mapping and sense-making tool which has been used to present and structure the data, make detailed and complex cross data queries, test hypotheses and build representation of real examples to support our claims. From the data analysis a model emerged describing four different modes of participation. The mobility or switching between modes exposed an "invisible" layer of element interactions not immediately evident in the user actions but inferred by analysing user reactions. Such activity is also observed in nature when a radically spreading "underground" network of fungi activity results in a ring or arc formation of mushrooms, also known as a "fairy ring". We call this process a "fairy ring" of participation because although the "visible" layer shows the user activities in different modes, it is the "invisible" network of element interactions that controls and affects these activities, similar to "fairy ring" formations in nature.

For the next phase of this research work, we plan to organise deep behavioural experimentations to have a better understanding of the rationale behind user actions, performing several different qualitative methodologies. This work will be important to support these claims and in identifying the role of each of the elements that affect participation. The use of Compendium in our research, allows us to further develop our research study and make it more open. We plan to share and debate these observations with a wider audience of practitioners, researchers and theorists. The data observations constitute the evidence for the interpretations and the claims presented in the paper, and are the basis on which we argue the validity of the presented model. Following an open scientific inquiry approach and an open research paradigm, we plan to share the collected data with the world for anyone to test or contest our arguments, and to enrich, question, or support the model we propose, so that our work can be just one of many possible contributions to the understanding of online user participation.

## References


Engeström, Y. (2009). From Teams to Knots: Activity Theoretical Studies of Collaboration and Learning at Work. *Learning in Doing Series: Social, Cognitive and Computational Perspectives*, Cambridge University Press.

Kaptelinin, V. & Nardi, B. (2006). *Acting with Technology: Activity Theory and Interaction Design.* Cambridge: MIT Press.

Lave, J. & Wenger, E. (1991). *Situated Learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Preece, J. & Shneiderman, B. (2009). The Reader-to-Leader Framework: Motivating Technology-Mediated Social Participation. *AIS Transactions on Human-Computer Interaction,* (1) 1, 13-32.

Renton, A. & Macintosh, A. (2007). Computer Supported Argument Maps as a Policy Memory. *The Information Society Journal*, 23(2), 125-133.

Selvin, A., & Buckingham Shum, S. (2005). Hypermedia as a productivity tool for doctoral research. *New Review of Hypermedia and Multimedia (Special Issue on Scholarly Hypermedia)*, 11 (1), 91-101.

Selvin, A., Buckingham Shum, S., Sierhuis, W.Horth, D. Domingue, J., Motta, E. & Li G. (2001). Compendium: Making Meetings into Knowledge Events. *Knowledge Technologies 2001*, March 4-7, 2001, Austin TX.

Squire, K & Durga, S. (in press). Productive gaming: The case for historiographic game play. To appear in *R. Ferdig (Ed.) The handbook of educational gaming.* Hershey, PA: Information Science Reference.

Wenger, E (1998). *Communities of practice: Learning, meaning and identity*. Cambridge, UK: Cambridge University Press.





ISBN 978-1-86220-225-2